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A MOTILE CURVED ANAEROBIC BACILLUS IN UTERINE DISCHARGES.*

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In a bacteriological study of leukorrheal discharges now in progress, curved bacilli have been found in a considerable number of cases. These bacilli are as a rule sparsely scattered among other organisms without definite indication that they play a part in maintaining the leukorrhea.

Due to the small number of curved bacilli and the difficulty with which they are isolated, numerous early attempts to obtain pure cultures met with repeated failures. In two later cases, however, morphologically similar bacteria were found in large numbers. One patient suffered from an infection following instrumental abortion; in the other case infection complicated labor at full term. Smears from the first patient revealed an overwhelming number of gram-negative, curved bacilli. Stained specimens of the vaginal and cervical discharges obtained from the patient with puerperal infection contained a great preponderance of apparently identical organisms. There were also present scattered gram-negative, fusiform bacilli, a fair number of gram-positive diplococci, and some gram-negative diplococci.

A single set of cultures from the abortion case failed to yield the desired growth and material for later cultures was not available.

In anaerobic cultures from the vagina and from the uterus of the patient with puerperal infection, the bacillus was readily isolated.

MORPHOLOGICAL CHARACTERISTICS.

The bacillus is a crescentically curved organism with rounded or tapering ends (Fig. 1). It equals the tubercle bacillus in length and is slightly greater in breadth. Staining occurs readily according to the usual methods. Gram's stain is not retained. There are no peculiarities of arrangement. Usually single, the bacillus some-

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times occurs in twos, placed end to end. In such instances segments of a circle may be formed, or the concave surfaces may lie upon opposite sides, giving rise to an S-shaped arrangement.

MOTILITY.

In hanging-drop preparations, the bacillus is very actively motile. It moves rapidly across the field with a peculiar corkscrew motion. Possibly the result of exposure to air, diminution in motility, accompanied by slight clumping, occurs within a few minutes.

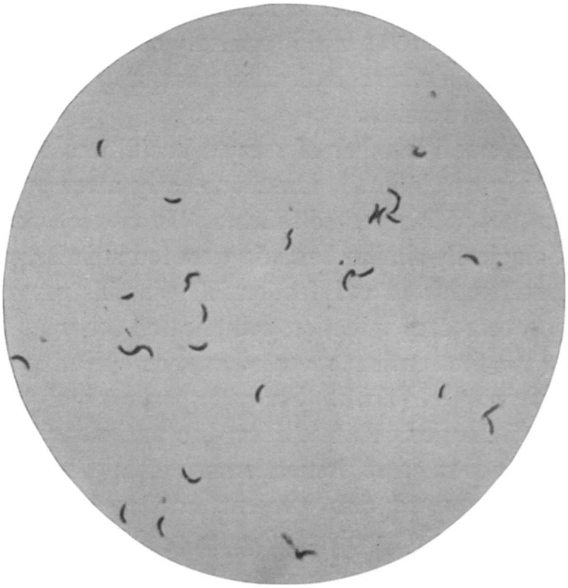

FIG. 1.—From culture on blood agar. Carbo gentian violet. × 1,000.

Under dark field illumination no additional noteworthy characteristics are observed.

Flagella are present (see Fig. 2). A single organism may be provided with as many as half a dozen. The arrangement and point of attachment of the flagella is subject to much variation.

CULTURAL CHARACTERISTICS.

Anaerobic cultures on blood agar are scarcely visible at the end of 24 hours. In 48 hours is obtained a translucent, fairly good growth. Growth occurs equally well on blood agar made from human, goat, or sheep blood. The culture medium is covered with a dustlike coat, composed of minute translucent colonies. In more dilute subcultures the colonies attain a diameter of two millimeters. Hemolysis does not occur. A somewhat disagreeable odor is noted upon opening the tubes. Anaerobic cultures on ascites agar develop only after a period of three days. The colonies attain pinhead size, are circular, elevated, and translucent.

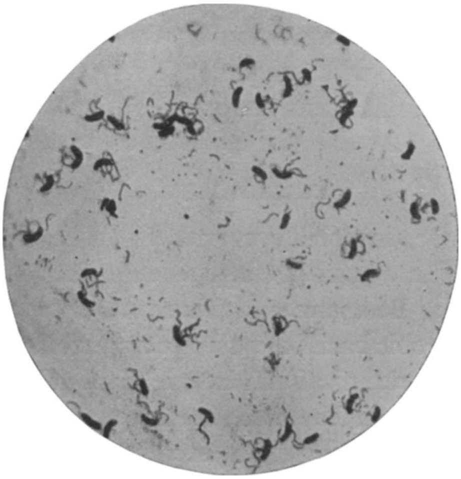

FIG. 2.—Flagella. Zettnow's silver nitrate method. × 1,000.

The water of condensation is somewhat cloudy and contains many organisms.

Cultures made under anaerobic conditions on plain agar, broth, litmus milk, gelatin, and potato fail to develop. On alkaline agar some growth occurs. Organisms on this medium frequently show nodular or hook-shaped enlargements. On glucose agar occurs a slow, but good growth.

The bacillus is a strict anaerobe. Under partial exclusion of oxygen, development does not occur.

Optimum growth is attained at blood temperature.

Cultures grown at room temperature show very poor development at the end of one week.

Cultures developed in the incubator and thereafter maintained at room temperature are viable at the end of four weeks. Heat at 55° C. for 15 minutes is sufficient to kill.

INJECTION OF RABBITS.

Cultures which had attained optimum growth were injected intravenously into rabbits without noticeable effect. Subcutaneous injection of two billions of bacilli was also harmless.

AGGLUTINATION.

Agglutination tests made during the height of the infection were weakly positive with the patient's serum, and negative with control serum. Similar tests performed during convalescence were negative.

CLASSIFICATION.

This anaerobe, invariably curved, is to be classed with the vibrios. In so far as can be ascertained a similar vibrio has not been cultivated. Lehmann and Neumann[1] in a consideration of vibrios and anaerobic bacilli mention no anaerobic vibrios or curved anaerobic bacilli. Menge and Kroenig[2] in a series of 70 vaginal examinations reported the frequent presence of comma-shaped bacilli. These were found in smears but could not be grown. Kroenig[3] obtained from the vagina an anaerobic streptococcus, non-pathogenic for animals, which was often found in symbiosis with a short curved bacillus. The curved bacillus lived for only one generation. Some of the curved organisms observed by Menge and Kroenig, and by Kroenig alone, are presumably identical with the one here described.

Heurlin[4] describes a curved gram-negative "Bacillus circularis major." His organism differs in that it produces hemolysis, takes anilin stains with the greatest difficulty, possesses neither motility nor flagella, and is pathogenic for animals.

The possibility of pelvic infection with this bacillus is to be earnestly considered. Like the anaerobic *Streptococcus putridus* of Schottmüller, even though non-pathogenic for animals, it may be virulent for human subjects. The presence of the bacillus in overwhelming numbers in two cases of infection, together with the fact that similar organisms are found in patients with leukorrheal discharge, makes further clinical observation desirable.

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[1] *Bakt. Diagnostik*, V. Auflage, 1912.

[2] *Bakt. des weiblichen Genitalkanales*, 1895.

[3] *Centralbl. f. Gyn.*, 1895, 19, p. 409.

[4] *Bakt. Untersuchungen des Keimgehalten im Genitalkanale*, etc., Helsingfors, 1910.